

Systems for collecting and managing data

- Paper based with manual data entry
- Paper based with OCR data entry
- Electronic data capture

Paper based with manual data entry

This method of data collection can include a variety of systems to manage your data. Typically, this would include a relational database management system with data entry screens. You may include double-data entry with a third person verifying the correct value where differences have been entered. Data from CRFs can be manually entered into systems such as:

Solution	License Cost involved?	Database?	Hosting?
MS Excel	Yes		Desktop
OpenClinica	Yes - for validated enterprise version No - for open source solution	MySQL / PostgreSQL	
EpiInfo	No – Open source	MS Access	Desktop application
MS Access	Yes. Only for developer, can be deployed using runtime environment	MS Access / MS SQL / MySQL	Desktop application but can link to ODBC compliant database such as MS SQL server.

Paper based with OCR data entry

This method of data management utilises optical character recognition (OCR). Typically, this would include the creation of a paper questionnaire using a form designer. This template would then be distributed for data collection. Upon completion the data entry staff would then scan the completed form and the system would then evaluate the form and ask the user to make changes based on system defined confidence levels. Solutions currently used at LSTM:

Solution	License Cost involved?	Database?	Hosting?
Formic	Yes	Excel	Hosted at LSTM
DataFax	Yes		
TeleForm	Yes	MS SQL	Hosted at MLW and Eijkman Institute of Molecular Biology, Indonesia.

Electronic Data Capture

Electronic data capture systems can increase the accuracy and completeness of your data as validation rules and range checks are incorporated at the point of capture. There are a range of solutions currently deployed at LSTM:

Solution	License Cost involved?	Database?	Hosting?
Smart PDFs	Yes		Desktop application
REDCap	REDCap is free for non-profit organisations	iPhone / Android / MySQL	Hosted at LSTM
Open Data Kit (ODK)	No	Android / MySQL or Postgres	In-house or can be cloud-based
Enketo	No	Windows / MySQL or Postgres	In-house or can be cloud-based
OpenClinica	Yes - for validated enterprise version No - for open source solution	MySQL / PostgreSQL	
EpiInfo	No – Open source	MS Access	Desktop application
Magpi	Yes	Android / MySQL	cloud-based
FileMaker Pro	Yes	Apple / MS SQL	cloud-based

Smart phones vs 'Dumb' phones

Whilst the explosion of smart phones has seen a rapid rise in the availability of apps and survey tools, the use of 'dumb' phones for electronic data collection remains a possibility, especially in low and middle-income countries (LMIC) setting. These include systems such as:

- Frontline SMS
- RapidPro